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**WO 01/65531 A1**

(54) Title: **INTERNET CONNECTED TO ELECTRONIC BILLBOARD**

(57) Abstract: The invention discloses a network that connects the Internet through a computer server to a multitude of electronically addressable public viewable displays. The network provides the public, via the World Wide Web, the opportunity to display an image on the display. A computer server connected to the Internet with its own URL acts as the gatekeeper for information being displayed on the electronic public viewable displays. The electronic public viewable display operates as a reflective, transmissive, emissive, multiple-view, three-dimensional, or transfective display, preferably in the form of a sign or a billboard.

## **INTERNET CONNECTED TO ELECTRONIC BILLBOARD**

### **FIELD OF THE INVENTION**

The invention pertains to the field of electronic public viewable displays. More specifically, the invention pertains to connecting the Internet to an electronic public  
5 viewable display to provide people who are connected to the Internet the opportunity to place an image onto an electronic public viewable display.

### **BACKGROUND OF THE INVENTION**

Advertising on public viewable displays such as billboards has been around for well over 100 years. However, these images are printed on a paper and laminated to a  
10 rigid backboard. This method of advertising is time consuming and costly. In addition, the cost and amount of work required to display an advertisement on a billboard usually requires that the advertisement is displayed for about two months. There have been several large electronic displays fabricated over the years, however they are expensive to fabricate and operate in an emissive mode of operation. Operating a billboard-size display  
15 in an emissive mode in natural sunlight requires several tens of kilowatts of electricity, and result in images which appear washed-out in the bright sunlight. Therefore, these large displays have never migrated over to an electronic billboard. The display of choice for a large billboard is a reflective display. However, the current state of the art provides no display technologies to construct such a large display.

20 The present invention of fiber-based display technology satisfies this need in the art by allowing for the construction of very large reflective fiber-based displays. Using fibers or linear structures with complicated shapes to construct reflective displays leads to low-cost fabrication and operation. By utilizing the Internet in the invention, wide spread usage opens up these displays to the general public.

## SUMMARY OF THE INVENTION

The present invention discloses a network connecting the Internet to an electronic public viewable display. The invention provides anyone who is connected to the World Wide Web the opportunity to place an image onto an electronic public viewable display. A computer server connects the Internet and the electronic public viewable display. The computer server acts as the gatekeeper for information being displayed on the electronic public viewable displays. The electronic public viewable displays operate as reflective, transmissive, transfective, multiple-view, three-dimensional or emissive displays and preferably serve as signs or billboards.

In an embodiment of the invention, a network connects the Internet through a computer server to at least one electronic public viewable display. Another embodiment of the invention presents a method which connects the Internet through a computer server to at least one electronic public viewable display. The method accomplishes this task by first creating an image to display on the electronic public viewable display. The image is preferably created by a client who wishes to display an image on an electronic public viewable display. The created image is sent to the computer server over the Internet. Preferably, a manager qualifies the image for display. The qualified image is sent to the electronic public viewable display so that it can be displayed on the electronic public viewable display.

## BRIEF DESCRIPTION OF THE DRAWING

Figure 1 schematically illustrates the relationship between the preferred components of an embodiment of the network of the present invention.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

The invention is a system or network that connects the Internet through a main computer server to a multitude of electronically addressable public viewable displays. The network provides general access to the public via the World Wide Web. The main computer server connected to the Internet has its own Internet Protocol Number or

Domain Name and can serve as a web site and act as the gatekeeper for information being displayed on the electronic public viewable display.

Referring to Fig. 1, the invention provides anyone who has access to the Internet (10) the opportunity to display an image on an electronic public viewable display (30).

5 The image can be an advertisement, a personal message, general information, or any qualifiable image. Since the displays are electronic, video images are also possible using the invention.

The one who creates the image to be displayed is referred to as the client (15). The client (15) can be an individual, company, group, organization, or anyone having access to the Internet and the desire to display an image on an electronic public viewable display (30), such as a billboard or a sign. The client (15) creates the image to be displayed on the electronic public viewable display (30) and sends it to the main computer server (20). The main computer server (20) is preferably a web site that manages the image to be displayed on the electronic public viewable display (30). The main computer server (20) has its own Internet Protocol Address.

A manager (25) on the main computer server (20) preferably receives the image and qualifies it before it is displayed on the electronic public viewable display (30). To qualify the image is to determine if there is any offensive or unlawful subject matter. If the image contains questionable subject matter, the manager (25) sends the image to a third party (33) for comments on the appropriateness of the subject matter of the image. Potentially questionable subject matter includes offensive images about sex, race, or creed. Appropriate third parties include a government agency, professional society, company, or an individual. If the image is approved, it can be displayed on the electronic public viewable display (30). If the image is rejected it will be sent back to the client (15) with an explanation of the offensive nature of the image. The client (15) can then alter the image and resubmit it for approval to be displayed on the public viewable display (30).

The most economical electronic public viewable display (30) is a display that operates in a reflective mode. This type of electronic public viewable display (30) has a low operating cost because it uses sunlight to illuminate the display during the day. In addition to not requiring generation of light, most reflective displays have a bi-stable mode

of operation, or once the image is written it stays until another image is written over it. Therefore, similar to traditional billboards, once the image is written on the display, no power is required to retain and display the image. Virtually all reflective displays use an electro-optic material that is electronically modulated. These reflective displays include  
5 liquid crystal displays (LCDs) such as twisted nematic, cholesteric-nematic, dichroic dye (or guest-host), dynamic scattering mode, and polymer dispersed liquid crystal displays, electrophoretic displays (both electrophoretic and microencapsulated electrophoretic), twisting ball displays or Gyricon displays, and electrochromic displays. Due to the low energy consumption of a reflective display, these displays could easily be powered by  
10 solar cells, batteries, fuel cells, a remotely controlled generator, or any combination of two or more of these power sources.

An alternative electronic public viewable display (30) is an emissive display. Currently, most large electronically addressable public viewable displays are emissive displays. Emissive displays are typically constructed by tiling small cathode ray tubes  
15 (CRTs) together. However, emissive displays also include plasma displays, field emissive displays (FEDs), electroluminescent displays, and light emitting diodes (LEDs). Emissive displays have very fast response times and can operate at video rates; however, they have very poor contrast ratios in bright sunlight. The poor contrast ratio makes the image appear washed out and not as sharp in bright sunlight, similar to the present day projection  
20 displays in room light.

Another type of electronic public viewable display (30) is a transmissive display. A transmissive display contains a shutter at each pixel that gates the light passing through it similar to an LCD in a laptop computer. One problem with transmissive displays is that they are difficult to fabricate in large sizes. One solution to this problem is to tile the  
25 displays. Another solution uses a plasma addressed back plane to address the liquid crystal material or a plasma addressed liquid crystal (PALC) display. A transmissive display can also be designed to operate in a reflective mode during the daylight hours and in a transmissive mode at night. This type of display is referred to as a transfective display.

Another embodiment of the present invention uses a multiple view display as the electronic public viewable display (30). By directing the light that creates the images to at least two different locations, a multiple view display is created. As viewers move past the display, they see one image then the next image. A multiple view display with two  
5 different images is preferably created by using two different lenses at alternating lines in the display, which direct the light to two different viewing zones. Two different images are interdigitally displayed on the same display to create the two views. The electronic public viewable display (30) can be a three-dimensional (3-D) display. Lenses at each pixel in the display can be used to create the 3-D image.

10 Using fibers with complex cross-sections and wire electrodes to construct the displays allows for the fabrication of large electronic public viewable displays. The linear structure or fiber can contain all the functionality of an entire line of a display, hence arraying the fibers into a sheet creates a fiber array display (FAD).

Irrespective of the type of electronic public viewable display (30) chosen, the  
15 image to be displayed on the electronic public viewable display is sent from the main computer server (20) to the display controller of the electronic public viewable display (30). The display controller would normally include memory, drive electronics, a processor, software, and hardware for communication with the main computer server (20). Those skilled in the art would be able to select appropriate commercially available  
20 controllers or components to implement the system depending upon the desired embodiment.

The connection between the main computer server (20) and the display controller of the electronic public viewable display (30) is preferably a secure link to keep vandals or hackers from placing an image on the electronic public viewable display (30). The link  
25 between the display controller of the electronic public viewable display (30) and the main computer server (20) is preferably either a hard wire connection, which includes a phone line, a cable line, or an electric line, or a connection established using electromagnetic waves, which includes a cellular phone or a satellite connection.

The electronic public viewable display (30) is any display that resides in a location  
30 which can be viewed by the general public, for example along a highway, train tracks, a

walkway, an airport, a casino, a hotel, or a lounge. Preferably, the electronic public viewable display (30) is large enough to be easily viewable by the general public.

A web site, residing on the main computer server (20) or connected to the main computer server (20), preferably includes a database of information about each of the electronic public viewable displays (30). The database preferably includes information on the location of each of the electronic public viewable displays (30), the size and resolution of each of the electronic public viewable displays (30), the distance between the viewer and each of the electronic public viewable displays (30), a perspective of an image on each of the electronic public viewable displays (30), the number of viewers passing by each of the electronic public viewable displays (30) during a given time interval, or a schedule showing the available times and costs for displaying an image on a certain electronic public viewable display (30). All of the information in the database is preferably available to the client (15), who uses this information to help them choose which electronic public viewable display(s) (30) to display their image(s) on, as well as the length of time they wish to display the image. Creative pricing can be established on the web site to charge for displaying the image on the electronic public viewable display. There are numerous ways to charge for display time including setting a specific price, an auction, a raffle, or a barter exchange.

Once the client (15) has visited the web site and determined the electronic public viewable display (30) on which they would like to place their image, the client (15) creates the image and sends it to the main computer server (20). The manager (25) preferably takes the image and transforms it to the resolution and aspect ratio of the display and sends it back to the client (15) for approval. If requested, the manager (25) sends several images back to the client (15) depicting what the image on the electronic public viewable display (30) will look like to a viewer after utilizing the information in the database concerning the location of the electronic public viewable display (30) with respect to the viewer.

A further embodiment of the invention adds a camera (35) to the network. The camera (35) is directed at a certain electronic public viewable display (30) to acquire an image indicative of the contents of that electronic public viewable display (30), as shown in Figure 1. The manager (25), the client (15) or a third party (33) can acquire an image

from the camera (35) to determine what is displayed on the electronic public viewable display (30). Allowing the client (15) to remotely see the electronic public viewable display (30) assures them that their image is properly displayed at the correct time. In addition, the manager (25) uses the camera (35) to make sure the electronic public  
5 viewable display (30) is functioning properly.

The invention is further illustrated by the following examples, which are meant to be illustrative, and not in any way limiting, to the claimed invention.

Example 1:

An individual connects to the World Wide Web (Internet) using a browser, such as  
10 the Netscape Navigator® browser or the Microsoft Internet Explorer® browser. The individual types in the domain name <http://www.nupix.com>. The browser connects the individual to a web site designed to allow the Internet user to display an image of their choice on a billboard of their choice at whatever time they choose.

The individual, who is the client (15), creates an image to be displayed on the  
15 billboard using an image generation software package. The client (15) then sends the image to the manager (25) on the main computer server (20). The manager (25) qualifies the image to be displayed. The manager (25) adjusts the image so that the image has the correct resolution and aspect ratio for the specified electronic billboard display. The modified image is then sent back to the client (15) for approval. In addition to the  
20 modified image, several perspective images of what a typical observer would see when looking at the electronic billboard are also sent back to the client (15). The client (15) chooses the time and location for the image to be displayed and, once the transaction is settled, the image is displayed on the billboard.

Example 2:

25 A client uses the electronic billboard to place a special announcement for their spouse or family member to be read as the spouse or family member drives by the billboard on their way to work. These special announcements include birthday, anniversary, or get well greetings.



Example 3:

A client (15) places different advertisements on the electronic billboard depending upon the time of day. For example, a restaurant such as the McDonalds® restaurant places a breakfast advertisement in the morning, a lunch advertisement in the afternoon, and a dinner advertisement at night.

Example 4:

In a preferred embodiment of the invention, the network contains information on the local weather at the billboard location. Depending upon the temperature, different advertisements are displayed. For example, if the temperature is cold, then a restaurant advertisement shows steaming hot coffee. Whereas, if the temperature is hot then the restaurant advertisement shows an icy cold soda.

Accordingly, it is to be understood that the embodiments of the invention herein described are merely illustrative of the application of the principles of the invention. Reference herein to details of the illustrated embodiments are not intended to limit the scope of the claims, which themselves recite those features regarded as essential to the invention.

What is claimed is:

- 1     1. A system for displaying images to the public comprising:
  - 2         a) at least one electronic public viewable display;
  - 3         b) a display controller that addresses said at least one electronic public viewable  
4             display to create an image that is displayed on said at least one electronic  
5             public viewable display;
  - 6         c) a computer server that stores digital information regarding said image, wherein  
7             said computer server is operatively connected to said display controller;  
8             and
  - 9         d) an internet connection to said computer server, wherein a user on said internet  
10            can provide digital information regarding said image and specifications  
11            regarding a time to display said image on said at least one electronic public  
12            viewable display.
- 1     2. The system according to claim 1, further comprising control logic associated with said  
2         computer server that allows a system manager to review said digital information  
3         regarding said image and specifications regarding said time to display said image  
4         before said image is displayed on said electronic public viewable display.
- 1     3. The system according to claim 2, wherein said manager sends said image to a third  
2         party to determine an appropriateness of said image before it is displayed on said  
3         electronic public viewable display.
- 1     4. The system according to claim 1, further comprising control logic that processes said  
2         information regarding said image provided by said user and sends information  
3         back to said user demonstrating how said image will be displayed on said  
4         electronic public viewable display.
- 1     5. The system according to claim 1, further comprising a camera operatively connected to  
2         said computer server such that said camera is aimed towards said electronic public  
3         viewable display and said user, manager, or third party can view a camera image of  
4         said electronic public viewable display acquired using said camera.

1 6. The system according to claim 1, wherein said electronic public viewable display is  
2 selected from the group consisting of:

- 3 a) a reflective display;
- 4 b) an emissive display;
- 5 c) a transmissive display;
- 6 d) a transreflective display;
- 7 e) a tiled display;
- 8 f) a multiple view display; and
- 9 g) a three-dimensional display.

1 7. A system according to claim 1, wherein said electronic public viewable display is  
2 constructed using at least one array of fibers to form a structure within said  
3 electronic public viewable display.

1 8. The system according to claim 1, wherein said connection between said computer server  
2 and said display controller is secure and is provided by either a wire or wireless  
3 communication link.

1 9. The system according to claim 1, further comprising control logic associated with said  
2 computer server that allows said user to pay to display an image on said electronic  
3 public viewable display for a set period of time.

1 10. The system according to claim 1, wherein said electronic public viewable display is at  
2 least partially powered by a power source selected from the group consisting of:

- 3 a) a solar cell;
- 4 b) a fuel cell;
- 5 c) a battery;
- 6 d) a remote generator; and
- 7 e) a hybrid arrangement of at least two of the above.

1 11. The system according to claim 1, further comprising a clock and a data storage device  
2 each associated with said display controller for storing information regarding said  
3 image and information regarding when said image is to be displayed such that said  
4 information regarding said image and information regarding when said image is to  
5 be displayed can be stored remotely on said data storage device and said display  
6 controller can display said image at appropriate times by operative connection to  
7 said clock and processing of said information regarding when said image is to be  
8 displayed.

1 12. The system according to claim 1, further comprising a database on or connected to said  
2 computer server including information pertaining to said electronic public  
3 viewable display, said database consisting of at least one of the following:  
4 a) information on the location of said electronic public viewable display;  
5 b) information on size and resolution of said electronic public viewable display;  
6 c) information on the distance and angle between a viewer and said electronic  
7 public viewable display;  
8 d) information on amount of traffic or number of viewers passing by said  
9 electronic public viewable display in a time interval; and  
10 e) a schedule of available times to display an image on said electronic public  
11 viewable display.

1 13. The system according to claim 1, further comprising control logic associated with said  
2 computer server that allows said user to pay to display an image on said electronic  
3 public viewable display.

1 14. A website providing users on the Internet the ability to display and/or view images on  
2 an electronic public viewable display.

1 15. A method of publicly displaying an image comprising the steps of:  
2 a) providing an electronic public viewable display associated with a computer  
3 server and an internet connection such that said electronic public viewable  
4 display can display images provided over said internet connection;

- 5           b) receiving an image to be displayed and providing said image to said computer  
6           server over an internet connection; and  
7           c) displaying said image on said electronic public viewable display .
- 1   16. The method according to claim 15, further comprising providing control logic  
2       associated with said computer server that allows a system manager to review said  
3       image before it is displayed on said electronic public viewable display.
- 1   17. The method according to claim 16, wherein said manager sends said image to a third  
2       party to determine an appropriateness of said image before it is displayed on said  
3       electronic public viewable display.
- 1   18. The method according to claim 15, further comprising processing said image and  
2       sending a user information demonstrating how said image will be displayed on said  
3       electronic public viewable display.
- 1   19. The method according to claim 15, further comprising providing a camera operatively  
2       connected to a computer server such that said camera is aimed towards said  
3       electronic public viewable display and a user can view a camera image of said  
4       electronic public viewable display over an internet connection.
- 1   20. The method according to claim 15, further comprising providing a database which  
2       stores information pertaining to said electronic public viewable display and images  
3       to be displayed thereon.
- 1   21. The method according to claim 20, wherein said database includes information  
2       regarding a location of said electronic public viewable display and a schedule of  
3       available times to display an image on said electronic public viewable display.
- 1   22. The method according to claim 15, wherein said electronic public viewable display is  
2       constructed using at least one array of fibers to form a structure of said electronic  
3       public viewable display.

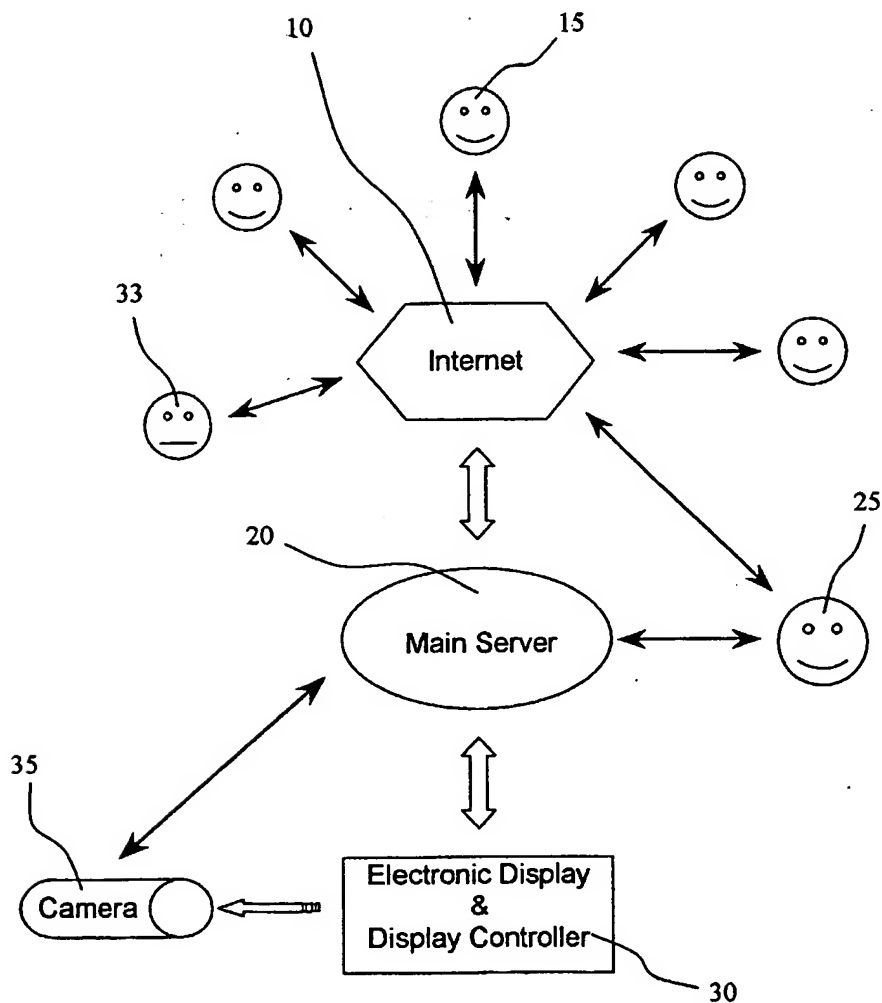
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**Figure 1**



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## INTERNATIONAL SEARCH REPORT

International Application No.  
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<b>A. CLASSIFICATION OF SUBJECT MATTER</b> IPC 7 G09F27/00 G06F17/60		
According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b> Minimum documentation searched (classification system followed by classification symbols) IPC 7 G09F G06F		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched		
Electronic data base consulted during the international search (name of data base and, where practical, search terms used) EPO-Internal		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 99 03050 A (DAVIDSON HUGO JAMES ; BROOKE PETER RAYMOND (AU)) 21 January 1999 (1999-01-21)	1,6, 8-16,20, 21
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Y	DE 196 47 341 C (LAUSCH HOLGER DR) 30 April 1998 (1998-04-30) column 2, line 29 - line 48 -/--	7,22
<input checked="" type="checkbox"/> Further documents are listed in the continuation of box C. <input checked="" type="checkbox"/> Patent family members are listed in annex.		
* Special categories of cited documents : 'A' document defining the general state of the art which is not considered to be of particular relevance 'E' earlier document but published on or after the international filing date 'L' document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) 'O' document referring to an oral disclosure, use, exhibition or other means 'P' document published prior to the international filing date but later than the priority date claimed 'T' later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention 'X' document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone 'Y' document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. '*&' document member of the same patent family		
Date of the actual completion of the international search 13 July 2001		Date of mailing of the international search report 20/07/2001
Name and mailing address of the ISA European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016		Authorized officer GALLO, G

## INTERNATIONAL SEARCH REPORT

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## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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P, X	WO 00 63771 A (SIGNATURE TECH INC) 26 October 2000 (2000-10-26)  claims; figures	1, 2, 6, 8-16, 20, 21



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Information on patent family members

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